SERVICE MANUAL

ADCOM®

POWER AMPLIFIER

GFA-555II

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ADCOM®

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INTRODUCTION

This service manual is intended to assist trained and qualified technical personnel in verifying the performance of, adjusting, and repairing the ADCOM GFA-555II power amplifier. The procedures described here are not intended for persons unfamiliar with the appropriate safety and test procedures.

⚠ WARNING ⚠

THERE ARE POTENTIALLY LETHAL VOLTAGES WITHIN THE GFA-555II AMPLIFIER WHICH WILL BE ACCESSIBLE ONCE ITS TOP COVER IS REMOVED. **DO NOT ATTEMPT FAMILIARIZATION, INSPECTION OR ANY PROCEDURE WHATSOEVER UNLESS YOU HAVE DISCONNECTED THE GFA-555II FROM THE WALL AC OUTLET OR OTHER SOURCE OF AC POWER AND THE POWER-SUPPLY CAPACITORS ARE COMPLETELY DISCHARGED.** PLEASE TAKE NOTE THAT THE POWER-SUPPLY CAPACITORS TAKE AS LONG AS **5 MINUTES** TO DISCHARGE. THESE INSTRUCTIONS ARE PROVIDED FOR USE ONLY BY COMPETENT TECHNICAL PERSONNEL. **DO NOT UNDERTAKE ANY SERVICE PROCEDURES IN THE GFA-555II UNLESS YOU ARE TECHNICALLY QUALIFIED TO DO SO.**

CIRCUIT DESCRIPTION

The ADCOM GFA-555II is a stereo power amplifier rated at less than 0.04% THD from 20Hz to 20kHz with 200 watts into 8 ohms and 325 watts into 4 ohms. The output stage is capable of greater than 60 amps into low impedance loads. The amplifier employs a discrete differential Class-A front- end followed by a Class-A voltage gain stage which amplify the input signal to the voltage required at the output of the amplifier. This high-voltage signal drives the high-current triple-Darlington-follower output stage which amplifies the current by a factor of about 50,000.

Referring to the accompanying schematic, describing the Left Channel only, the input signal passes through network C101, C102 and R103 which provide a 3dB bandwidth of 1.7Hz to 500kHz to the input of the amplifier. C101 is an extremely high quality capacitor and serves to protect the amplifier and the speakers connected to it from DC faults at the output of the preamplifier. **WE DO NOT RECOMMEND THAT C101 BE SHORTED OUT.** Q101 and Q102 form the differential input stage.

Open-loop gain is defined by R105 and the bias current through Q101 and Q102. The small-signal gain is approximately 825/(2x25)=16. The next voltage gain stage consists of Q107 with Q108 as a current-source load. DC bias is set by R116, D103 and D104. Open-loop gain is defined by R112 and R113, with R201, R301, C105, C201, and C301 providing high-frequency compensation.

Feedback is provided from the output to the base of Q102 by the network R123, R124 and C106. C106 provides a high-frequency roll-off above 200kHz, improving stability by taking high-frequency feedback before the triple Darlington.

The input stage is biased by R108, R109, R110, R122, R115, R114, R128, R116, Q103, Q105, Q108, D101 through D105, and the overtemperature LED, D903. Q105 is turned on when the B+ supply is on. A current of about 4mA flows through the thermal breaker on the heatsink and into D103 and D104. If the heatsink overheats, the breaker opens and the current flows through D105 and the THERMAL OVERLOAD LED instead. When the breaker carries the current, D103 and D104 are biased at 1.4V. This creates about 0.7V across R114; Q103 then sources about 2mA to Q101 and Q102, the differential input stage. If the negative supply fails or its fuse opens, Q103 saturates, Q101 turns off, turning off Q107, D301 turns on and Q108 saturates. This holds the input to the triple Darlington to near ground. If the positive supply fails or its fuse opens, Q105 turns off and the bias circuitry is disabled.

Any DC imbalance in the amplifier is corrected by R125, R126, R127, C107, C110 and IC101. Any DC error at the amplifier output is servoed back through IC101 to adjust the DC current through the input transistors. DC bias is nominally 1.0mA through Q101 and Q102. IC101 provides the DC bias current to Q101 and can swing from ground to +10V to bring the amplifier into balance.

The bias network of R117 through R119 and Q307 form a temperature-compensated DC-bias voltage to the input of the triple-Darlington-follower output stage. Mid- and high-frequency bypassing is provided by C104.

R901 and C901 provide a load for the amplifier at high frequencies, stabilizing the amplifier under varying load conditions. D201 and D301 provide a high-current return to the power supply for backlash current from the load.
The output stage consists of two sets of 4 parallel transistors operated as emitter followers, driven by another pair of emitter followers. This configuration minimizes distortion caused by varying load impedances. The output transistors have 0.22-ohm ballast resistors to ensure current sharing and bias stability.

TEST PROCEDURES

All tests are performed with a 120V, low-distortion (less then 2%), AC-power source, 8-ohm resistive load, (except slew rate), and a signal source of not more than 600 ohms.

Tests are performed after warming up the amplifier at 66 watts into an 8-ohm load for at least 10 minutes.

All grounds during testing are referred to the ground of the black output terminals, **EXCEPT FOR RCA INPUT-JACK GROUNDS AND ANY SIGNAL-GENERATOR GROUND. DO NOT CONNECT RCA INPUT-JACK GROUNDS TO BLACK OUTPUT-TERMINAL BINDING POSTS, DAMAGE TO THE GROUNDING SYSTEM OF THE AMPLIFIER MAY RESULT.**

80kHz low-pass filter is employed during THD distortion measurements.

Signal-to-noise measurements are "A" weighted.

Damping factor is measured by comparing the 20-watt-output voltage with and without an 8-ohm load.

Slew rate is measured with an inductive lo
ad, and is derived with a dual-time-based oscilloscope reading the slope of a full-power (120V peak-to- peak) 5kHz square wave. To avoid damaging output networks R901/C901 AND R951/ C951 **DO NOT OPERATE THE AMPLIFIER AT FULL-POWER, SINE-WAVE ABOVE 22kHz OR FULL-POWER (120V PEAK-TO-PEAK) SQUARE WAVE ABOVE 5kHz.**

IMPORTANT

BEFORE PROCEEDING WITH ADJUSTMENTS, MAKE SURE AMPLIFIER IS AT ROOM TEMPERATURE.

BIAS ALIGNMENT

1. With set-up as per the first paragraph of TEST PROCEDURES and with NO SIGNAL IN, set bias controls (R119 and R169) to midpoint.
2. Connect a millivolt meter across TP201 and TP301.
3. Turn amplifier on and allow a 3 to 5 minute settling period.
4. Adjust BIAS control R119 to obtain either a + or — 10mV(± 1mV) indication on the millivolt meter.
5. Connect a millivolt meter across TP251 and TP351.
6. Adjust BIAS control R169 to obtain either a + or — 10mV (± 1mV) indication on the millivolt meter.
7. To check for proper bias setting, remove millivolt meter and apply input signal to obtain 66 watts into 8 ohms for 10 minutes with cover on.
8. Remove input signal and connect the millivolt meter as in Step 2 and step 5. Let amplifier idle until bias stabilizes and readjust to 10mV (± 1mV).

ADCOM GFA-555II SERVICE PARTS LIST

1. AUDIO INPUT/DRIVER PCB ASSEMBLY

INTEGRATED CIRCUITS

IC101, IC151	ADCOM 3A	

TRANSISTORS:

Q101, Q102, Q151, Q152	2SC2362(K)(G)	
Q103, Q153	2SC2240	
Q104, Q106, Q154, Q156	2SA1016(K)(G)	
Q105, Q107, Q155, Q157	2SA1210	
Q108, Q158	2SC2912	

DIODES:

D101, D102, D103, D104, D151, D152, D153, D154	1SS178	
D105, D155	1SS81	

DIODES, ZENER:

D106, D156	GZA20X	20 VOLT

CAPACITORS, ELECTROLYTIC:

C104, C154	50V/4.7uF	
C109, C159	25V/470uF	

CAPACITORS, FILM:

C103, C153	100V/0.1uF	
C107, C108, C110, C157, C158, C160	50V/0.1uF	
C101, C151	100V/1uF	ROEDERSTEIN MKC 1862 ELECTRONIC CONCEPTS 5MC22B105K

CAPACITORS, MICA:

C102, C152	100V/330pF	
C105, C155	500V/15pF	
C106, C156	500V/50pF	

RESISTOR, VARIABLE:

R119, R169	41-7126-0-0	2000 OHMS

RESISTORS, OXIDE METAL-FILM, 5%:

R104, R154	½W/100 ohms
R107, R157	½W/3.9 kohms

RESISTORS, METAL-FILM, 1%

R101, R151	¼W/1 Mohms
R102, R152	¼W/100 kohms
R103, R111, R124, R153, R161, R174	¼W/1 kohms
R105, R155	¼W/825 ohms
R106, R156	¼W/365 ohms
R108, R158	¼W/47.5 kohms
R109, R123, R159, R173, R180	¼W/22.1 kohms
R110, R160	¼W/133 ohms
R112, R113, R162, R163	¼W/33.2 ohms
R114, R164	¼W/301 ohms
R115, R122, R165, R172	¼W/10 kohms
R116, R166	¼W/100 ohms
R117, R167	¼W/381 ohms
R118, R168	¼W/1.82 kohms
R126, R176	¼W/1.5 Mohms
R128, R178	¼W/475 ohms
R129, R179	¼W/33 kohms

RESISTORS, FUSIBLE, 5%

R120, R121, R170, R171	¼W/100 ohms	

RESISTORS, CARBON-FILM, 5%

R125, R127, R175, R177	¼W/4.7 Mohms	

THERMOSTATS:

S101, S151	⚠ 81-7014	UP62, 85° C

SWITCH:

S102	81-322-0-0	B22JH

2. LEFT CHANNEL OUTPUT PCB ASSEMBLIES

TRANSISTORS:

Q201	2SC2912
Q202	2SD1047
Q203, Q204, Q205, Q206	2SD424
Q301	2SA1210
Q302	2SB817
Q303, Q304, Q305, Q306	2SB554
Q307	2SC2240

DIODES:

D201, D301	EPG50D

CAPACITORS, MICA:

C201, C301	500V/68pF

CAPACITORS, ELECTROLYTIC:

C202, C302	160V/47uF	ECEA2AGE-470

RESISTORS, OXIDE METAL-FILM:

R202	½W/470 ohms
R203, R302	½W/1 kohms
R204	½W/33 ohms

RESISTORS, METAL-FILM:

R201, R301	¼W/47 ohms
R205, R207, R209, R211, R303, R305, R307, R309	¼W/10 ohms

RESISTORS, CEMENTED WIRE-WOUND:

R206, R208, R210, R212, R304, R306, R308, R310	2W/0.22 ohms

THERMISTOR:

TH901	TD5-C310DA

3. RIGHT CHANNEL OUTPUT PCB ASSEMBLIES

TRANSISTORS:

Q251	2SC2912
Q252	2SD1047
Q253, Q254, Q255, Q256	2SD424
Q257	2SC2240
Q351	2SA1210
Q352	2SB817
Q353, Q354, Q355, Q356	2SB554

DIODES:

D251, D351	EPG50D

CAPACITORS, MICA:

C251, C351	500V/68pF	

CAPACITORS, ELECTROLYTIC:

C252, C352	160V/47uF	ECEA2AGE-470

RESISTORS, OXIDE METAL-FILM:

R252	½W/470 ohms
R253, R352	½W/1 kohms
R254	½W/33 ohms

RESISTORS, METAL-FILM:

R251, R351	¼W/47 ohms
R255, R257, R259, R262, R353, R355, R357, R359	¼W/10 ohms

RESISTORS, CEMENTED WIRE-WOUND:

R256, R258, R261, R263, R354, R356, R358, R360	2W/0.22 ohms

THERMISTOR:

TH902	TD5-C310DA

4. FILTER CAPACITOR PCB ASSEMBLIES

RESISTORS, OXIDE METAL-FILM:

R801, R802, R803, R804	3W/3.9 kohms
R805	2W/8.2 kohms

CAPACITORS, FILM:

C806, C807, C808, C809	100V/0.01uF

5. CHASSIS-MOUNTED COMPONENTS

AC POWER SWITCH:

S801	⚠ 12005C	BLACK, CARLING RGSCC-711-R-B-B-O
	⚠ 12005CW	WHITE, CARLING RGSCC-711-R-W-W-O

POWER TRANSFORMER:

T801	⚠ 23-2044-0-0	ADCOM

CAPACITORS, ELECTROLYTIC:

C802, C803, C804, C805	⚠ 100V/15000uF	ADCOM

CAPACITORS, FILM:

C901, C951	100V/0.01uF	

CAPACITORS, SPARK-KILLER:

C801	⚠ 400V/0.01uF	ECKDNS103ZV

RESISTORS, OXIDE-METAL FILM, 5%:

R901, R951	2W/10 ohms

SILICON RECTIFIERS:

D801, D802	⚠ 400V/25A	KBP2504

RCA JACKS:

J901, J951	VTW-J5MI	ADCOM

SPEAKER TERMINALS:

J902, J952	R33729	RED, ADCOM
J903, J953	B33729	BLACK, ADCOM

FUSE HOLDERS:

FH801	FH052	
FH802, FH803, FH804, FH805	FH032	

FUSES:

FU801 (120V UNIT)*	⚠ ABC-12/250V	BUSSMAN
	3AB314012/250V	LITTELFUSE
	CES6-12A/125V	SOC
FU801 (220V UNIT)*	⚠ AGC-7/250V	BUSSMAN
	3AG312007/250V	LITTLEFUSE
FU801 (240V UNIT)*	⚠ AGC-6/250V	BUSSMAN
	3AG312006/250V	LITTELFUSE
	CES14-6A/250V	SOC
FU802, FU803, FU804, FU805*	⚠ AGC-7/250V	BUSSMAN
	3AG312007/250V	LITTELFUSE
	3AG 7A/125V	BEL

LEDs:

D803	LTL2201	RED, POWER INDICATOR
D903	LTL2201	RED, THERMAL PROTECTION
D901, D902	LTL2251	YELLOW, INSTANTANEOUS DISTORTION ALERT

6. POWER SUPPLY PCB ASSEMBLY FOR OPTIONAL FAN MOTOR, ISSUE "B"

INTEGRATED CIRCUITS:

IC601	NJM4558
IC602	NJM78M24FA

TRANSISTORS:

Q601	2SA1469R

DIODES:

D601	1SS178
D602	DBA10B

CAPACITORS, ELECTROLYTIC:

C601	50V/10uF
C602	35V/1000uF

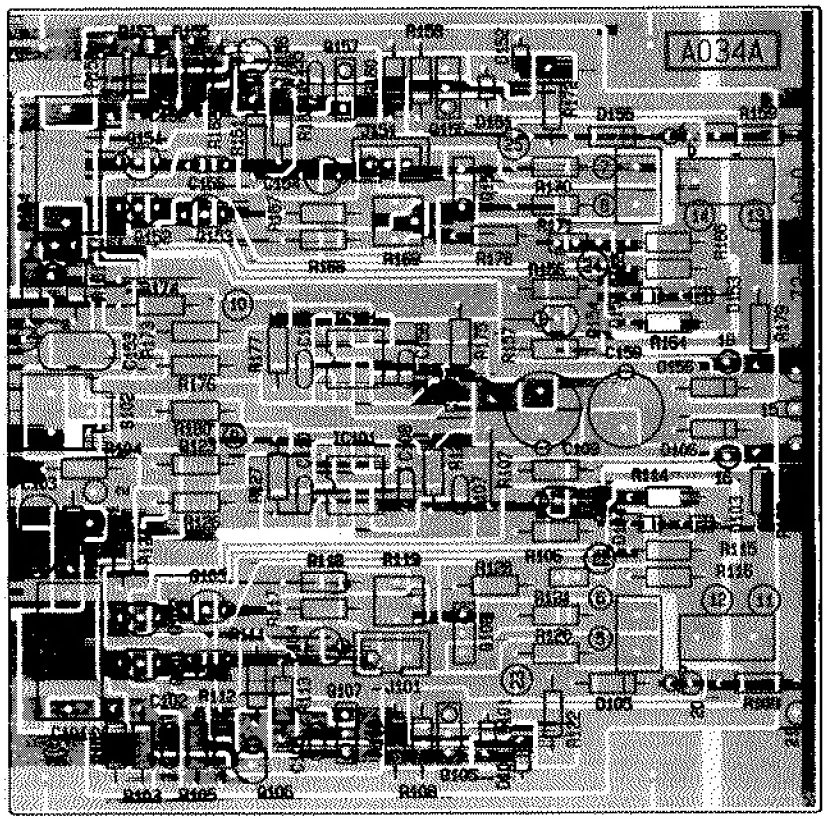
RESISTORS, CARBON-FILM, 5%:

R601, 604	¼W/7.5 kohms
R602	¼W/9.1 kohms
R603, R605, R606	¼W/24 kohms
R607	¼W/150 kohms
R608	¼W/10 kohms
R609	¼W/1 kohms

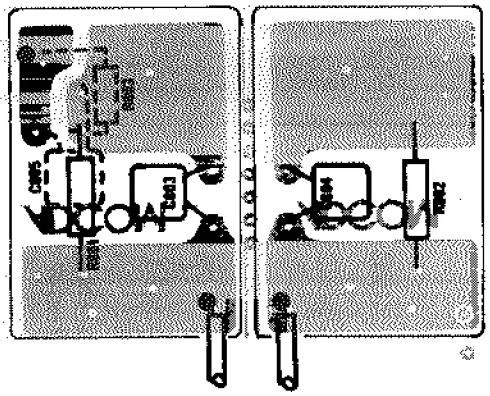
* The fuses listed, and their time-current blowing points, have been carefully selected and thoroughly tested to deliver optimal performance while still accomplishing their protective functions. Replace these fuses, individually, only with the specific types listed. **DO NOT USE ANY SUBSTITUTE FUSES WITH DIFFERENT RATINGS,TIME-CURRENT CURVES OR VALUES.** These may cause serious damage to the amplifier circuits and **MAY CREATE A FIRE HAZARD.**

⚠ **Because of fire, shock and/or other hazards, parts identified by, and listed with, this sign MUST** be replaced with the **IDENTICAL FACTORY PART** listed in the SERVICE PARTS LIST. No substitutions with other "equivalent" parts can be made.

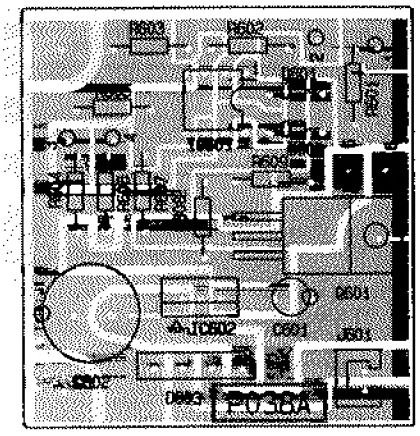
GFA-555II AUDIO INPUT/DRIVER PCB ASSEMBLY



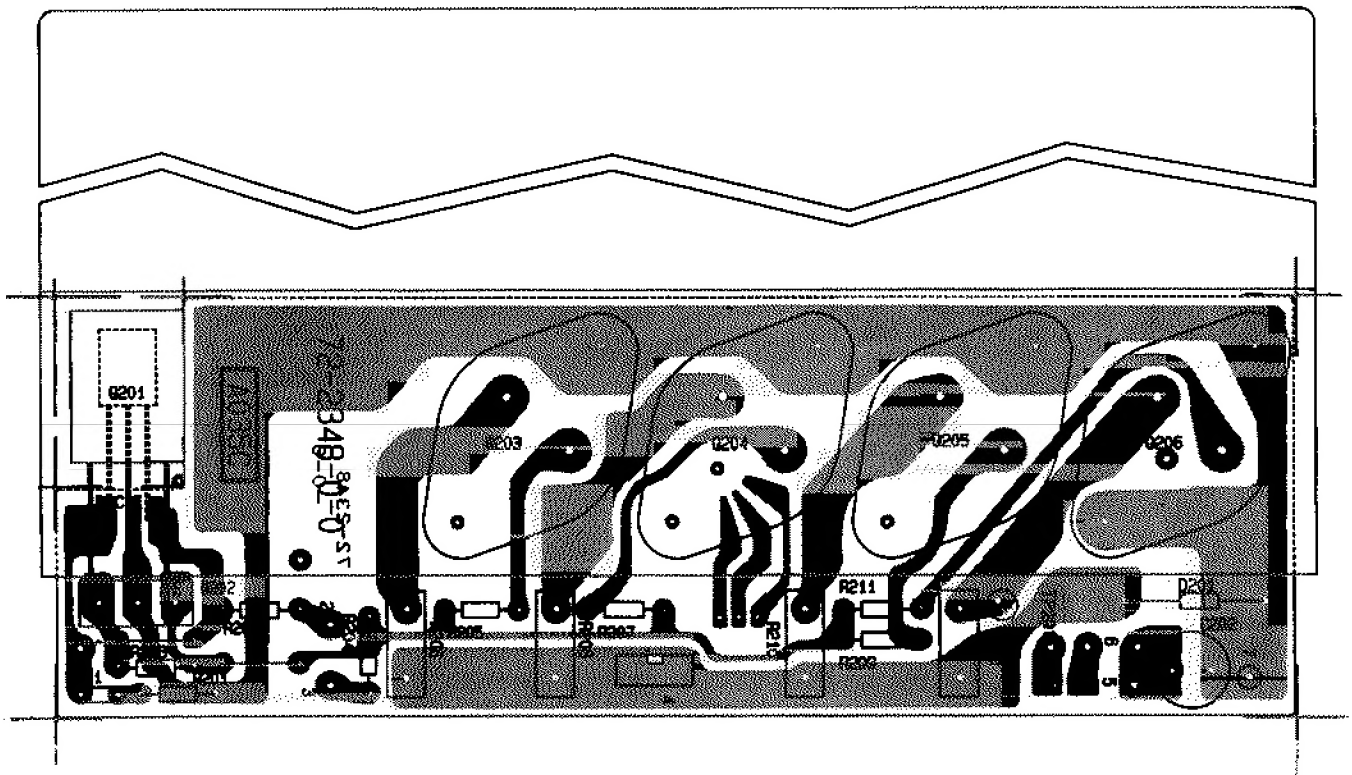
GFA-555II FILTER CAPACITOR PCB ASSEMBLIES



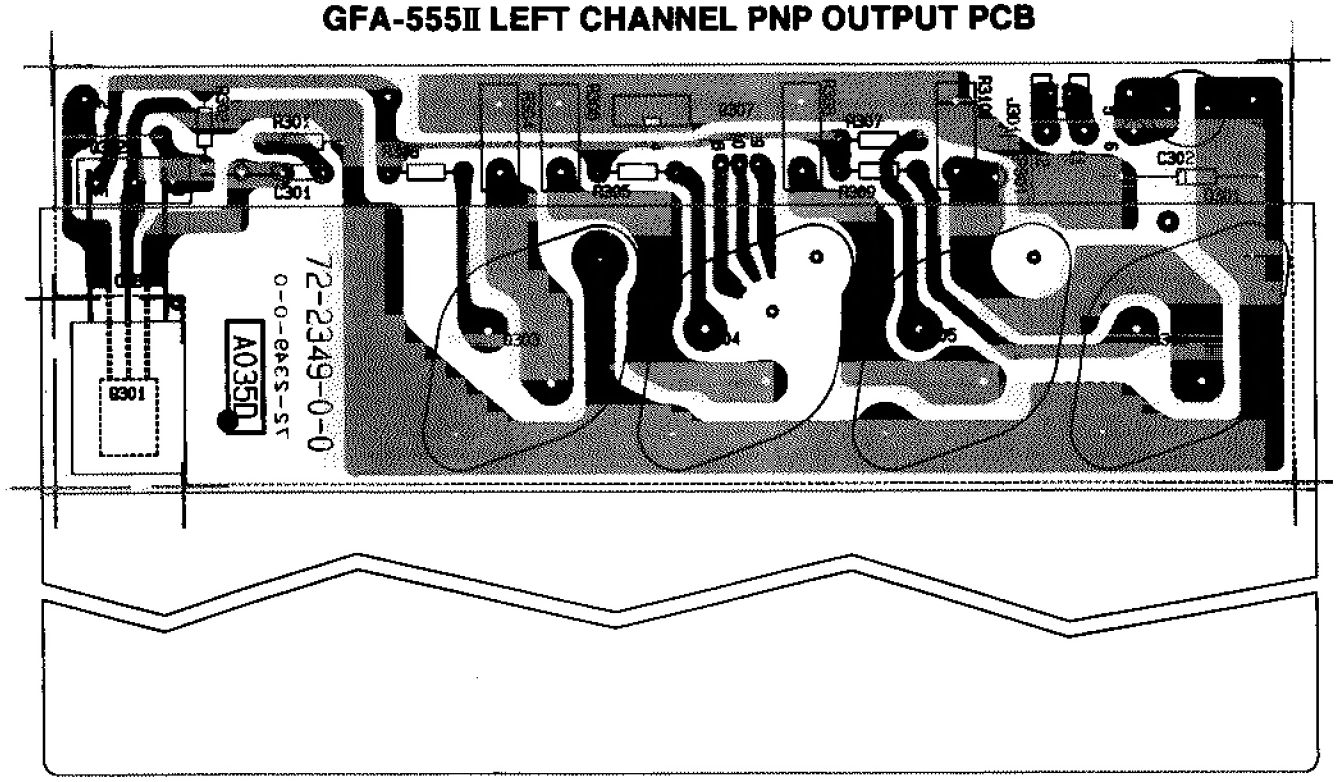
GFA-555II POWER SUPPLY PCB ASSEMBLY FOR OPTIONAL FAN MOTOR, ISSUE "B"



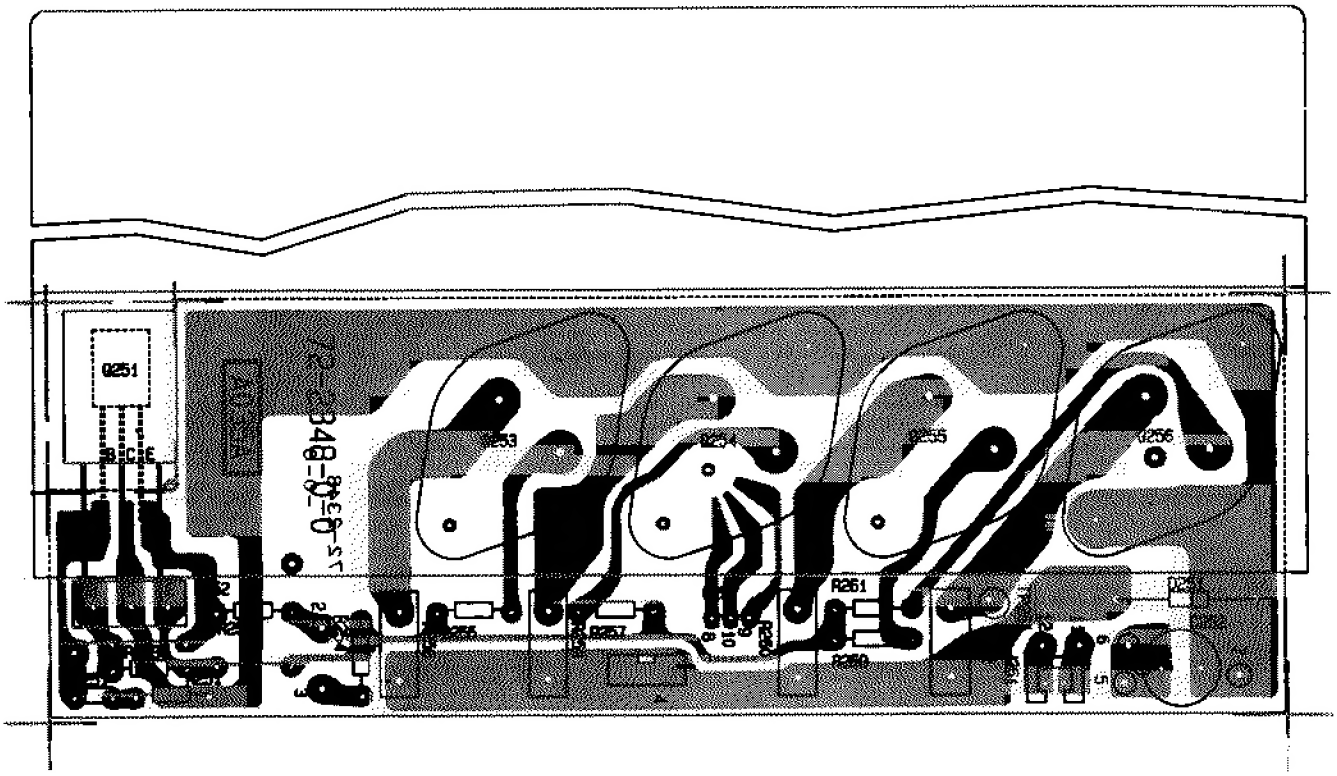
GFA-555II LEFT CHANNEL NPN OUTPUT PCB



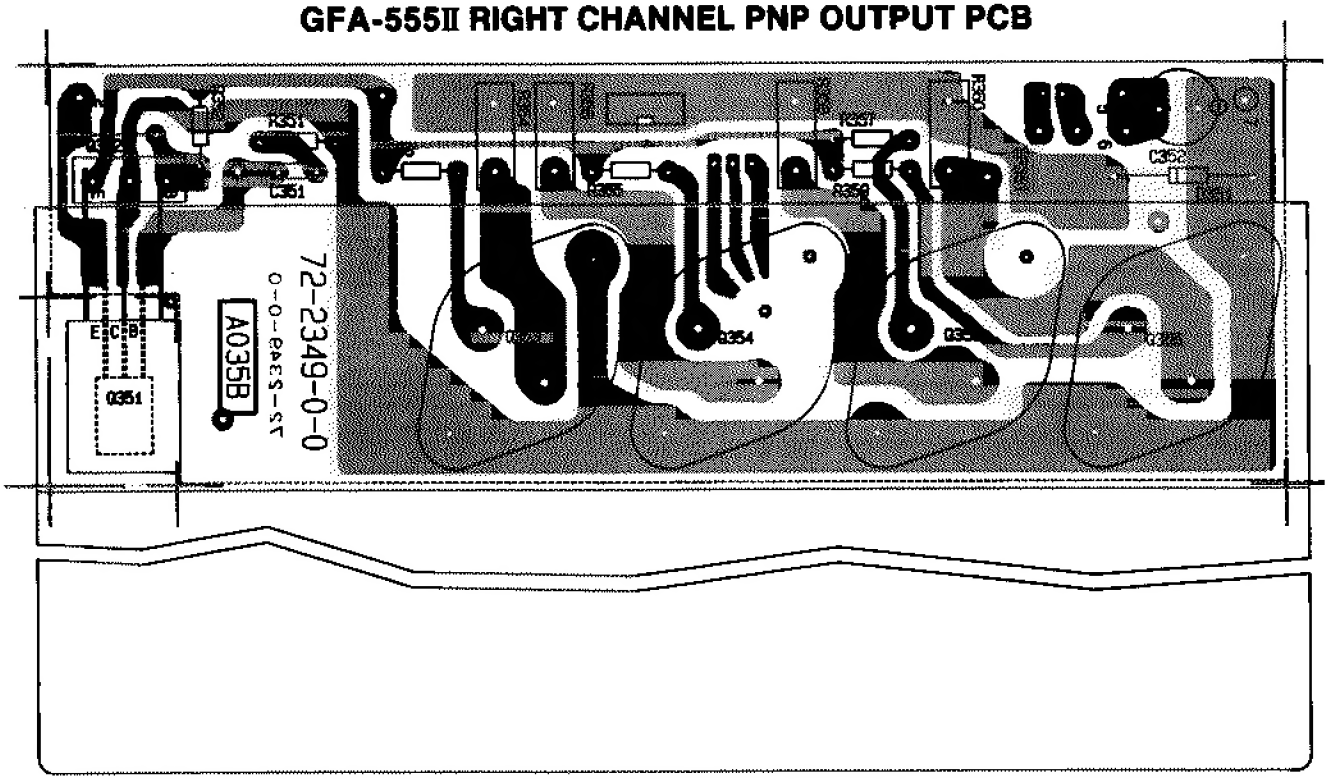
GFA-555II LEFT CHANNEL PNP OUTPUT PCB



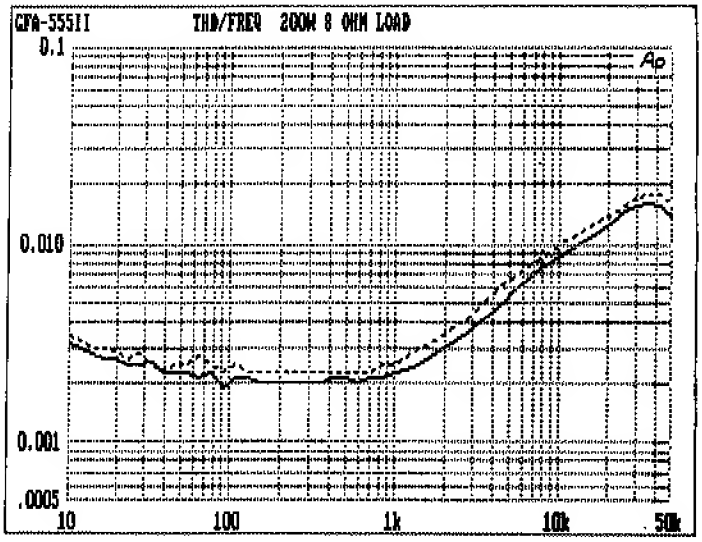
GFA-555II RIGHT CHANNEL NPN OUTPUT PCB

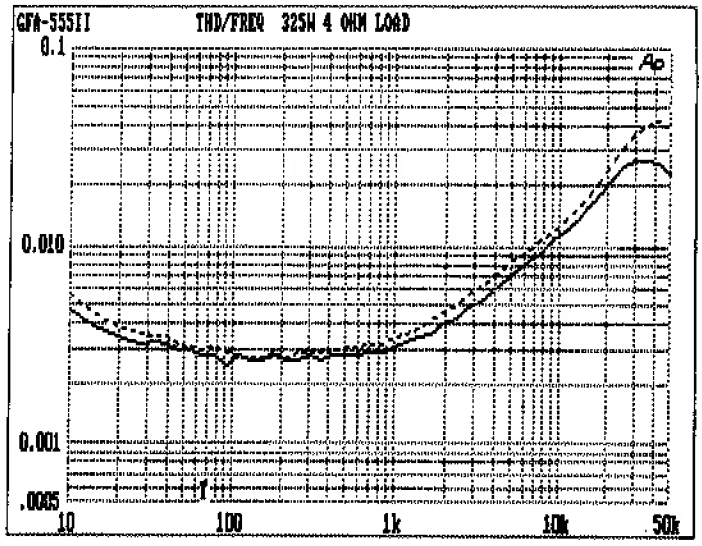


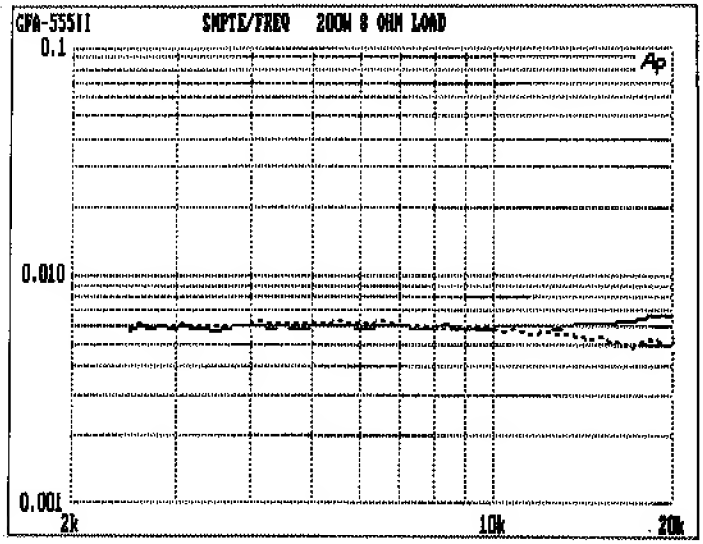
GFA-555II RIGHT CHANNEL PNP OUTPUT PCB

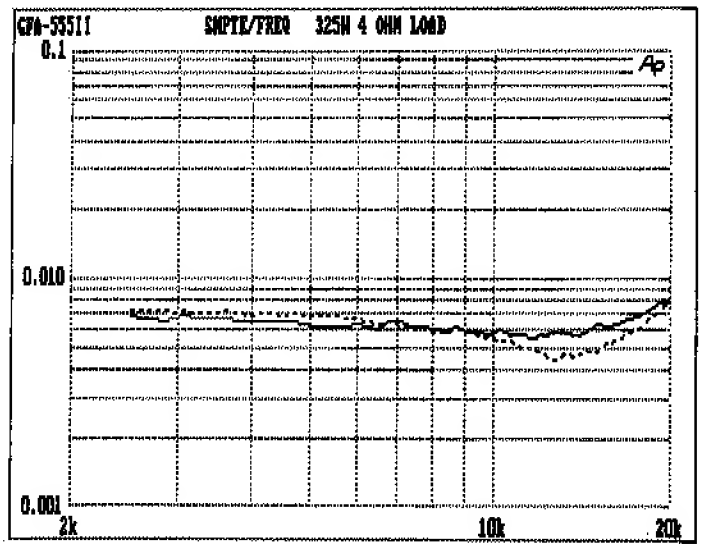


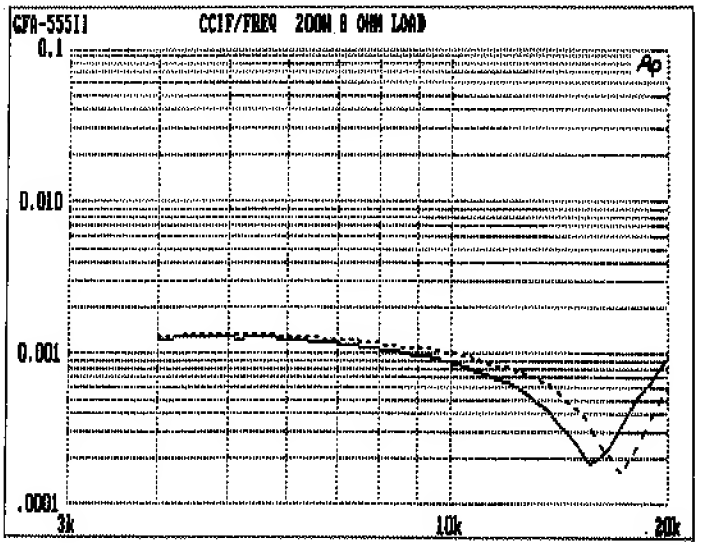
GFA-555II
TYPICAL PERFORMANCE DATA

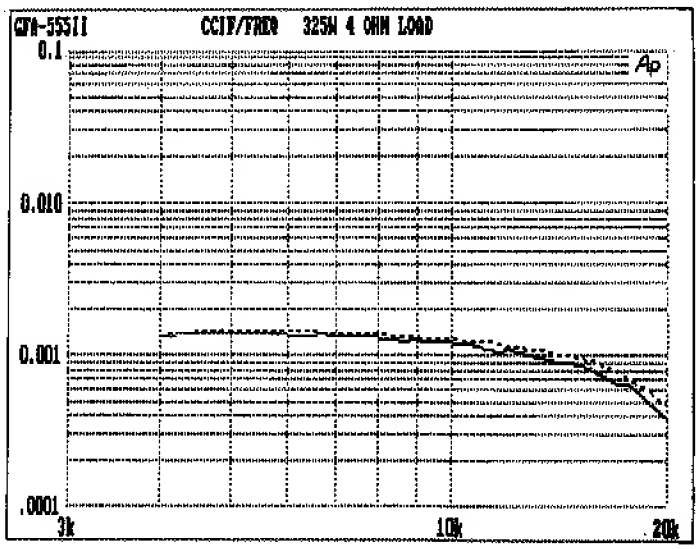












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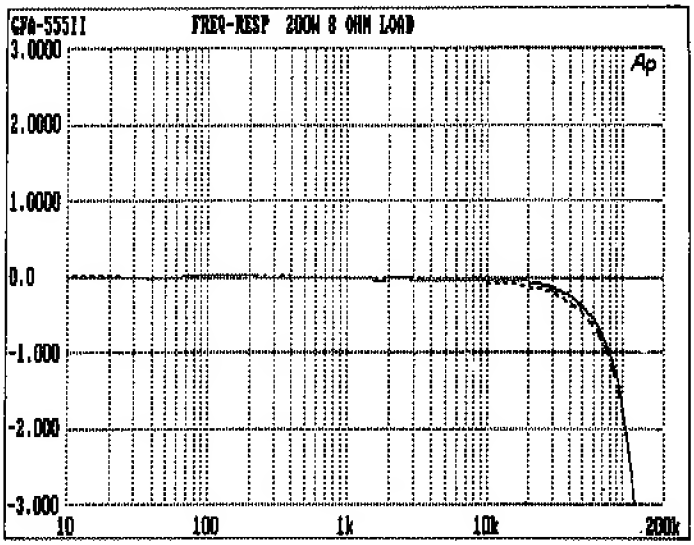
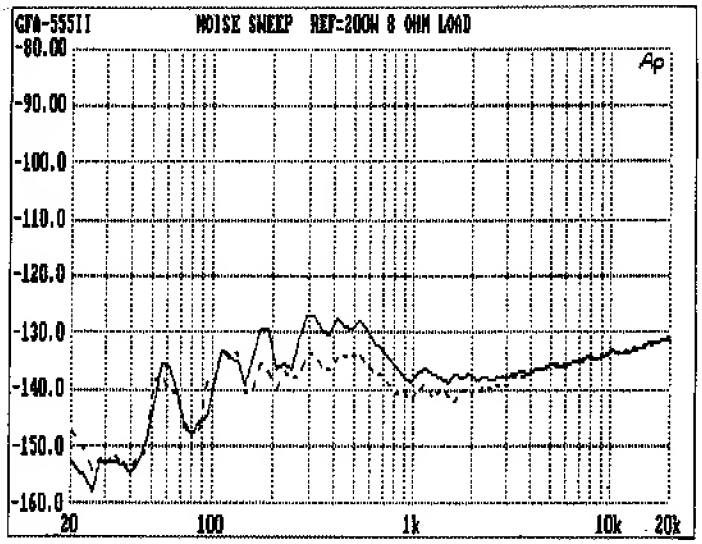
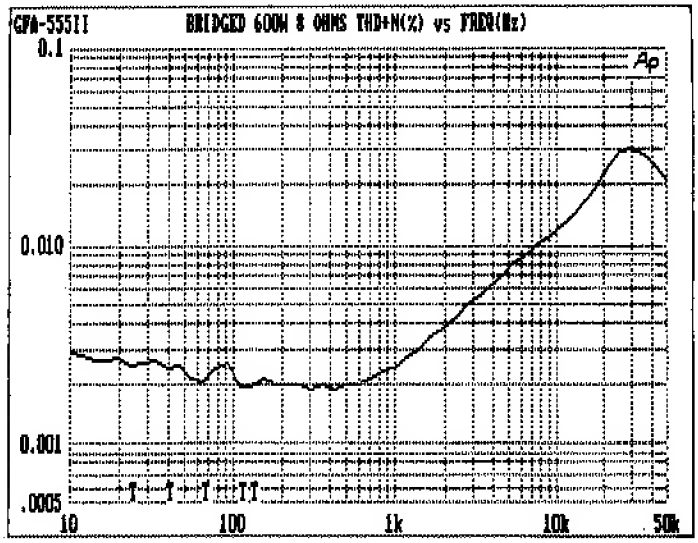
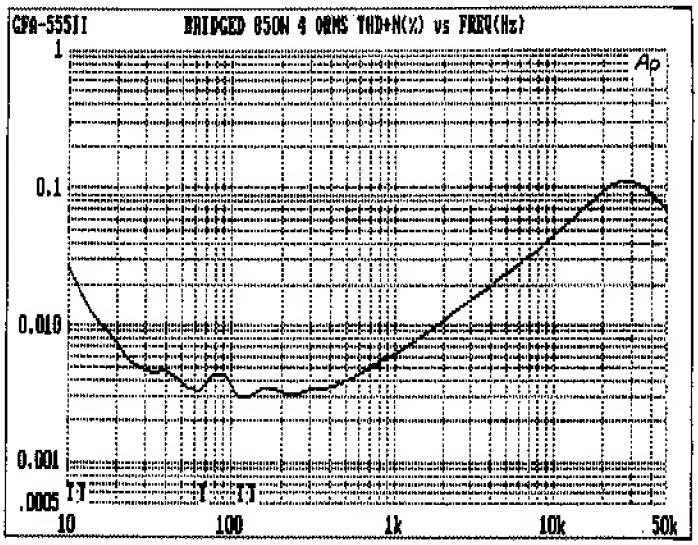
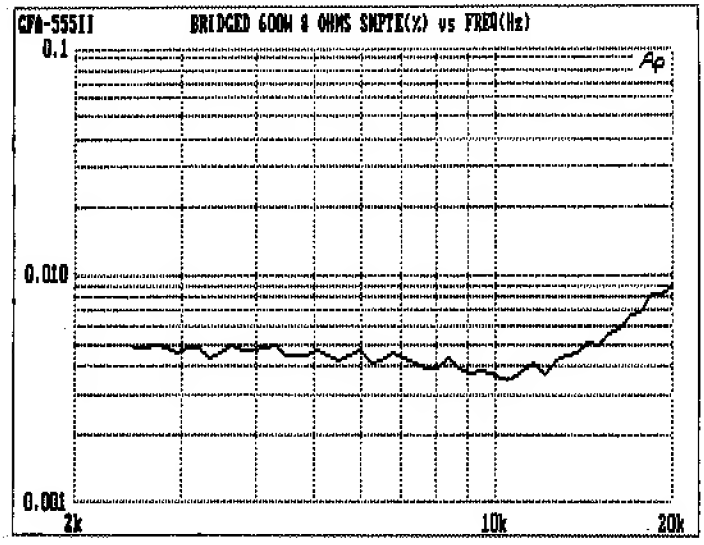
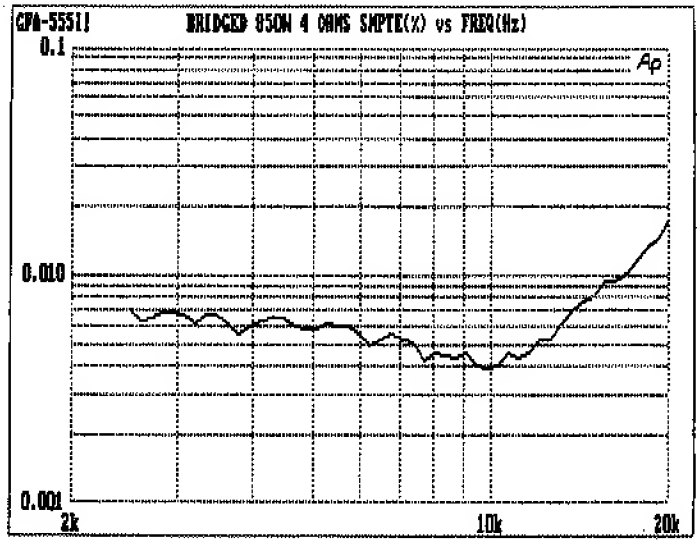












GFA-555II SPECIFICATIONS

Power Rating (To FTC Requirements)

200 watts continuous average power into 8 ohms at any frequency between 20Hz and 20kHz with both channels driven at less than 0.04% THD.

325 watts continuous average power into 4 ohms at any frequency between 20Hz and 20kHz with both channels driven at less than 0.04% THD.*

600 watts continuous average power into 8 ohms at any frequency between 20Hz and 20kHz at less than 0.09% THD, bridged.*

* With fan option installed.

IM Distortion (SMPTE)

1 watt to 200 watts into 8 Ohms	≤ 0.009%
1 watt to 325 watts into 4 Ohms	≤ 0.009%

IM Distortion (CCIF, Any Combination from 4kHz to 20kHz)

200 watts into 8 Ohms	≤ 0.002%
325 watts into 4 ohms	≤ 0.003%

THD + Noise at 200 Watts into 8 Ohms

20Hz	0.004%
1kHz	0.003%
10kHz	0.006%
20kHz	0.010%

THD + Noise at 325 Watts into 4 Ohms

20Hz	0.005%
1kHz	0.004%
10kHz	0.015%
20kHz	0.025%

IM Distortion, Bridged (SMPTE)

1 watt to 600 watts into 8 Ohms	≤ 0.05%
1 watt to 850 watts into 4 Ohms	≤ 0.05%

IM Distortion, Bridged (CCIF, Any Combination from 4kHz to 20kHz)

600 watts into 8 Ohms	≤ 0.005%
850 watts into 4 Ohms	≤ 0.005%

THD + Noise at 600 Watts into 8 Ohms, Bridged

20Hz	0.004%
1kHz	0.004%
10kHz	0.02%
20kHz	0.04%

THD + Noise at 850 Watts into 4 Ohms, Bridged

20Hz	0.01%
1kHz	0.007%
10kHz	0.05%
20kHz	0.09%

Frequency Response @ 1 Watt into 8 Ohms

10Hz to 20kHz	+0, −0.25dB

Power Bandwidth (−3dB)	1.7Hz to 100kHz
Dynamic Headroom into 4 Ohms	2.5dB

Signal-to-Noise Ratio, "A" Weighted

200 watts into 8 Ohms	≥110dB

Gain	27dB
Input Impedance	100,000 ohms

Input Sensitivity
- 200 watts into 8 Ohms ..... 1.75V rms
- 1 watt into 8 Ohms ..... 130mV rms

Damping Factor
- 20Hz to 20kHz ..... ≥ 800

Rise Time
- 5kHz,120V peak-to-peak square wave, 20% to 80% 2.3us

Semiconductor Complement ..... 42 transistors, 2 zener diodes, 13 diodes, 2 ICs, 2 diode bridges

Power Consumption (Continuous, Both Channels Driven)
- Quiescent 72VA
- Maximum 1500VA
- 200 watts into 8 Ohms 675VA
- 325 watts into 4 Ohms 1180VA
- 600 watts into 8 Ohms, bridged 1320VA

GENERAL

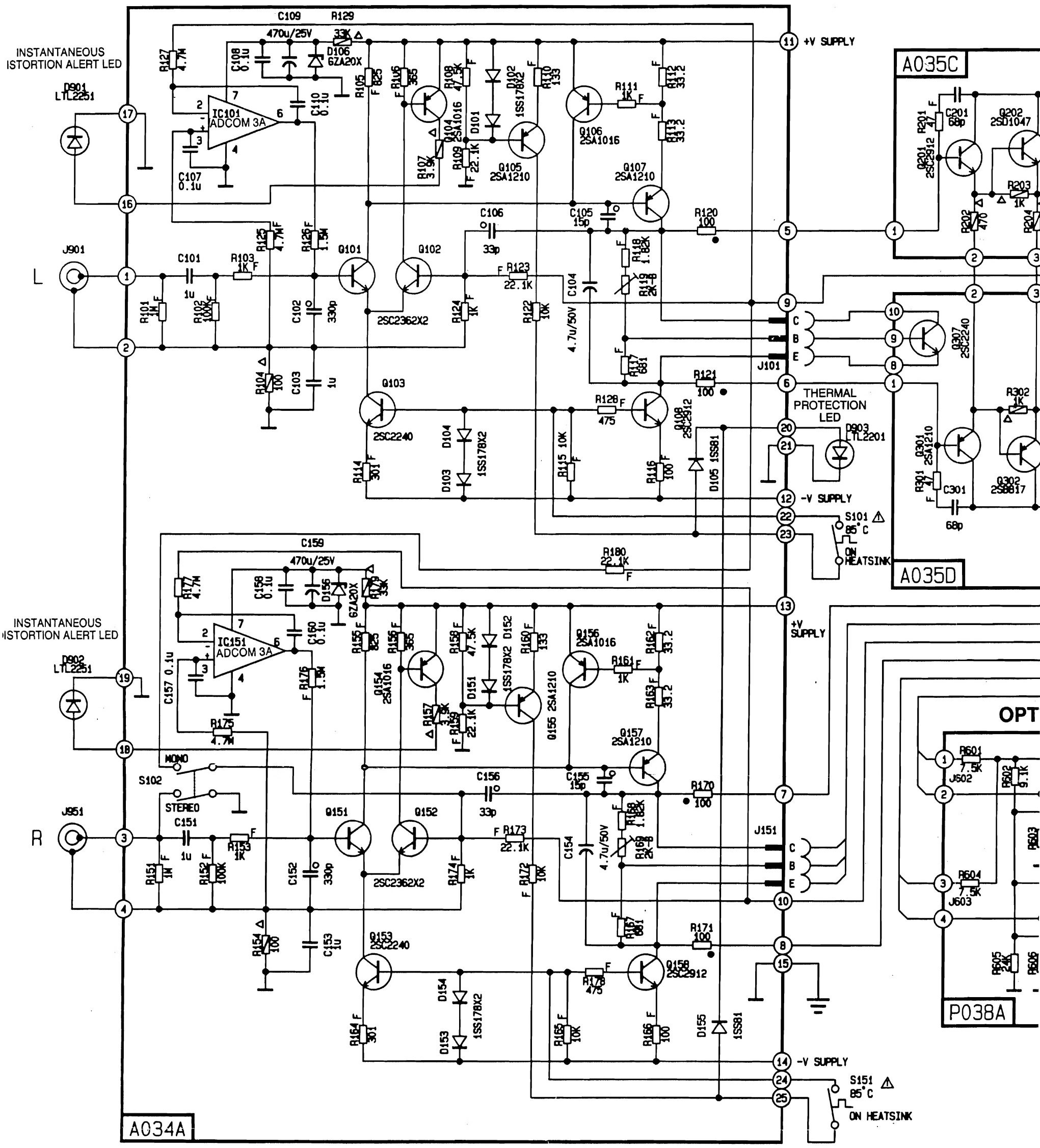
Power (available in 220V or 240V on special order) 120VAC/50-60Hz
Chassis Dimensions ..... 6¾"(172mm) x 17"(432mm) x 12 3/16"(310mm)
Maximum Dimensions ..... 7¼"(185mm) x 17"(432mm) x 12 3/16"(310mm)
Weight ..... 35 lbs. (16kg)
Weight, Packed ..... 39 lbs. (18kg)

ADCOM®

ADCOM Service Corp.
10 Timber Lane
Marlboro, NJ
07746

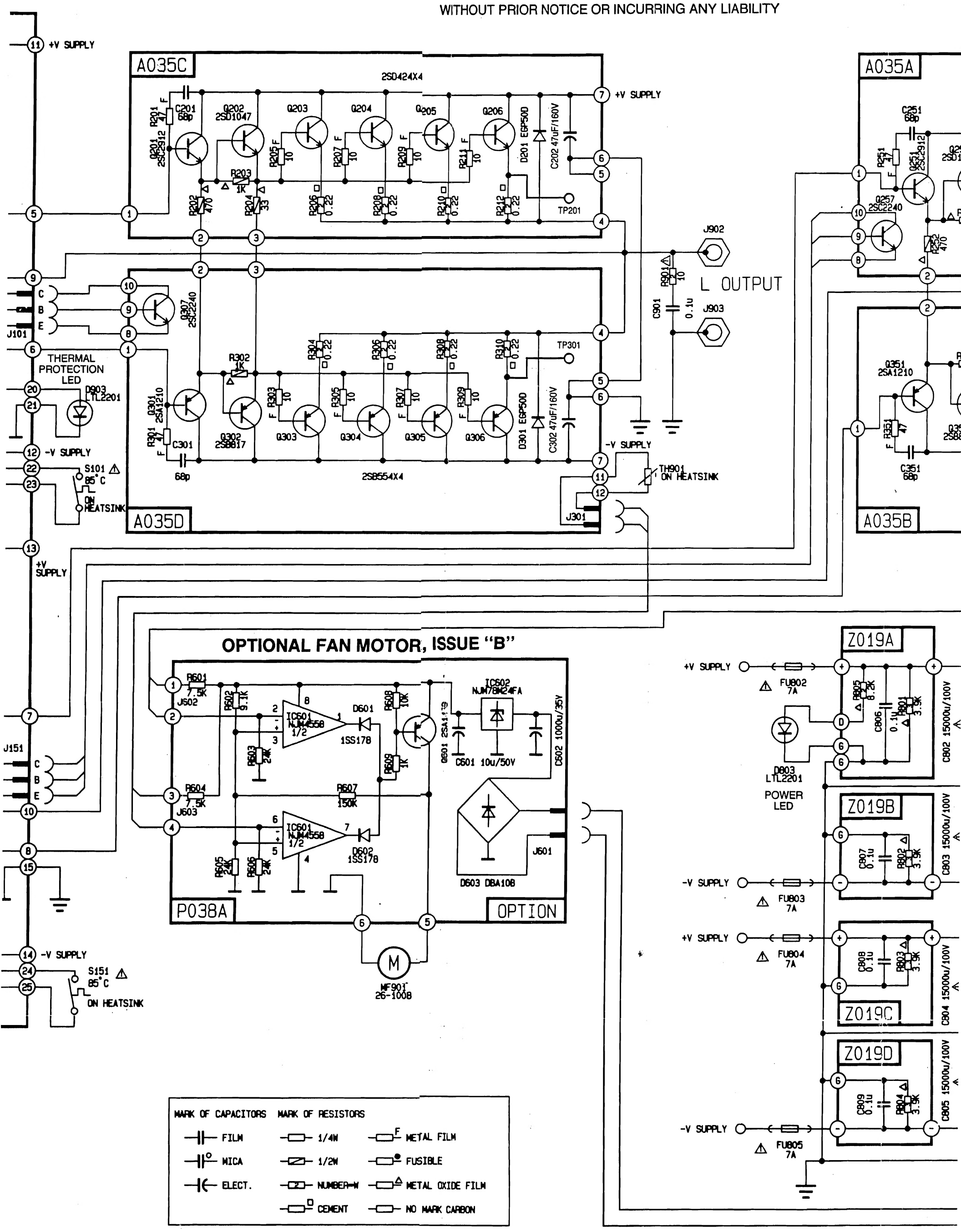
(732) 683-2356
Mon. Thru Fri.
9 AM to 4 PM
Eastern Time

SCHEMATIC DIAGRAM GFA-555II



MARK OF CAPACITO
FILM
MICA
ELECT.

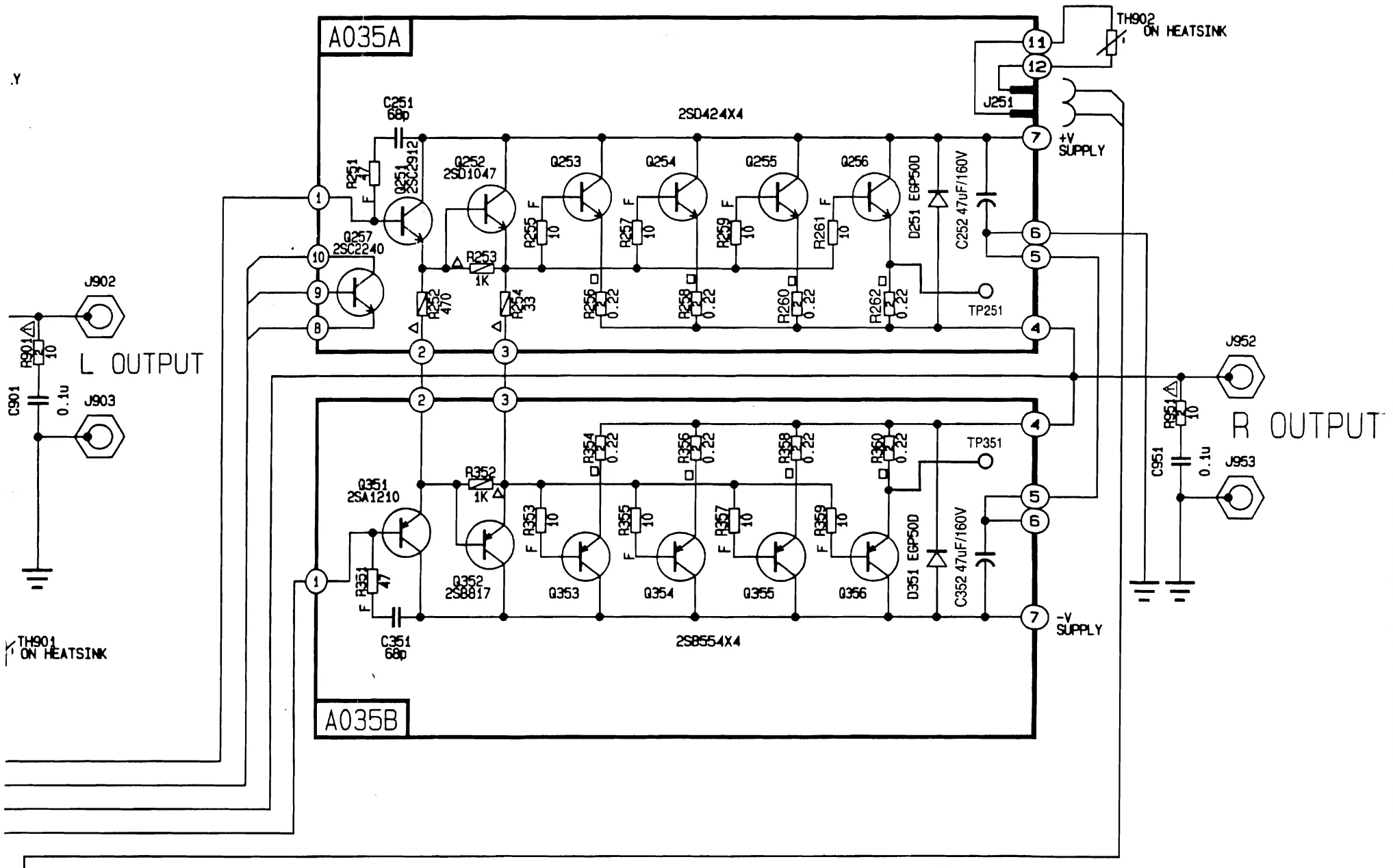
NOTE: ADCOM RESERVES THE RIGHT TO MODIFY CIRCUITRY AND/OR CHANGE COMPONENTS TO UPGRADE PRODUCT WITHOUT PRIOR NOTICE OR INCURRING ANY LIABILITY

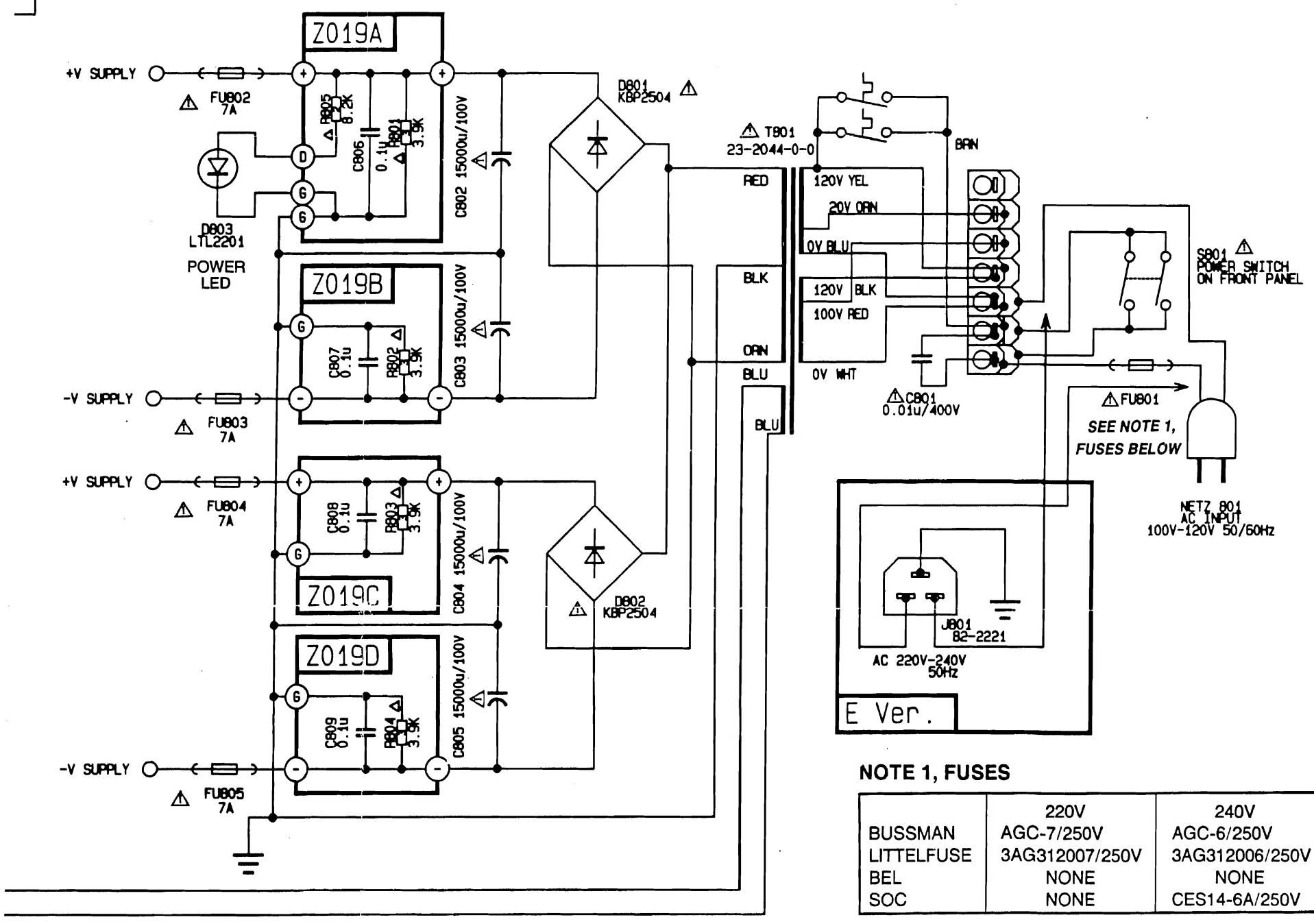


MARK OF CAPACITORS	MARK OF RESISTORS	
FILM	1/4W	F METAL FILM
MICA	1/2W	FUSIBLE
ELECT.	NUMBER-W	METAL OXIDE FILM
	CEMENT	NO MARK CARBON

MODIFY CIRCUITRY
) UPGRADE PRODUCT
RING ANY LIABILITY

.Y





NOTE 1, FUSES

	220V	240V
BUSSMAN	AGC-7/250V	AGC-6/250V
LITTELFUSE	3AG312007/250V	3AG312006/250V
BEL	NONE	NONE
SOC	NONE	CES14-6A/250V